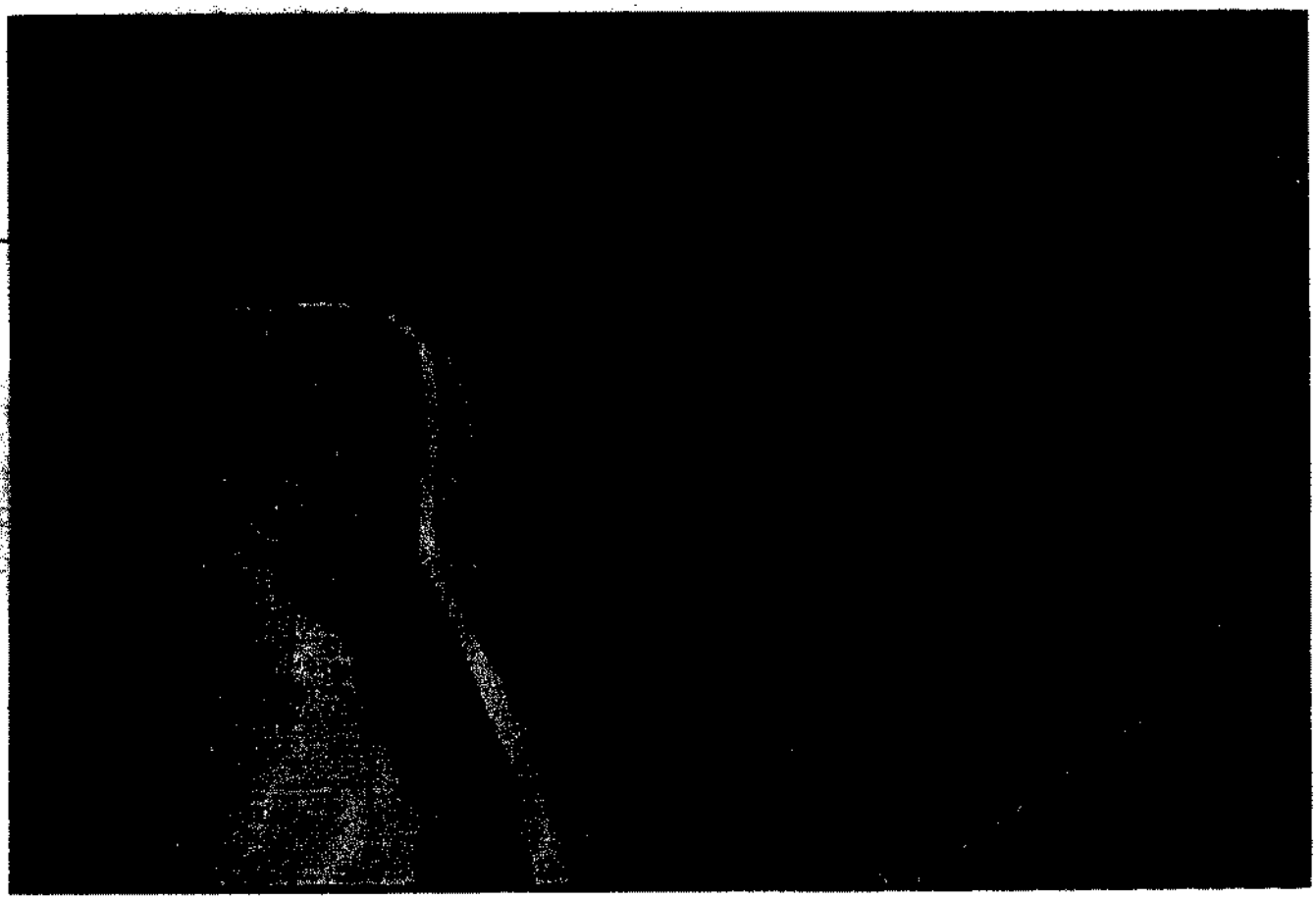
A Sustainable Alternative to Replace the Grand Prairie Area Demonstration Project



Presented by:

Arkansas Chapter of the American Fisheries Society
Arkansas Chapter of The Wildlife Society
Arkansas Wildlife Federation
Augusta Chamber of Commerce
Augusta City Council
Augusta Improvement Club
Clarendon Chamber of Commerce
National Wildlife Federation
White River Conservancy
Wildlife Management Institute

May 2001

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Executive Summary

Arkansans have a choice: unsustainability versus sustainability. This fundamental choice regards the future direction for using, managing and sharing Arkansas' valuable water resources. The U.S. Army Corps of Engineers (Corps) now is ready to begin construction of a pumping station and a 650-mile, regional distribution system, to divert water from the White River to irrigate rice farms on the Grand Prairie. The Grand Prairie Area Demonstration Project (GPADP) needs only a federal appropriation from Congress, which the Corps expects by Summer of 2001. If construction begins, an irreversible chain of events will commence, likely cascading into as many as 13 irrigation projects that would re-plumb most of Arkansas' agricultural watersheds. There still is time to avoid this path to the Delta's version of "water wars."

The Situation

- Agricultural irrigation accounts for about 89 percent of groundwater withdrawal in the Grand Prairie.
- The agricultural community has known since 1927 that the rate of groundwater withdrawal is unsustainable.
- The White River basin:
  - hosts the White River and Cache River National Wildlife Refuges—the largest remaining functional bottomland hardwood ecosystem on any tributary of the Mississippi River;
  - supports the largest population of wintering mallards in North America;
  - supports the state's only native population of black bears;
  - harbors one of the most important and diverse fisheries resources in Arkansas and the Mississippi Delta; and
  - is recognized by an international convention as a "wetland of international importance."

Corps' Proposal

- The Corps proposes to solve the problem of the depleted alluvial aquifer by degrading yet another important water resource, Arkansas' internationally renowned White River.
- The Corps' proposal would:
  - build a pumping plant on the White River to remove 1,640 cubic feet per second of water (1.06 billion gallons/day, 115 billion gallons/year);
  - build a 650-mile regional water distribution system across private farmlands;
  - increase irrigation efficiency modestly, from 60 percent to an optimized 70 percent;
  - construct 8,849 acres of new on-farm irrigation storage reservoirs;
  - irrigate 209,046 acres of cropland on fewer than 867 farms;
  - cost $319 million—$367,935 per farm or $1,525 per irrigated acre;
  - still require a 15.6-percent decline in irrigated acreage; and
  - meet none of its major objectives, including preserving the alluvial aquifer.
- The GPADP also would:
  - buttress near-record commodity surpluses;
  - suppress already-low commodity prices;
  - hamper farmers' ability to earn enough profit from their yields to stay in business; and
  - further compound problems with the nation's agricultural economy.
- Almost half of the farmers—the would-be beneficiaries—in the area oppose the project.

Sustainable Alternative

- The sustainable alternative endeavors to use the Grand Prairie within its sustainable water limits, rather than reengineer this unique area to buttress and temporarily extend unsustainable uses.
- This alternative highlights the reality that—when confronted with critical, long-term water shortages—it is wiser to spend money to save water, than to waste water to save money.
- The sustainable alternative
  - does not exploit the White River;
  - maximizes (instead of optimizes) irrigation efficiency, to 80 percent or higher from 60 percent;
  - maximizes the number and capacity of on-farm irrigation storage reservoirs;
  - reduces the size of the irrigation problem, from 362,662 acres to no more than 94,692 acres; and
  - recommends using public money to convert unsustainable cropland into less-water-demanding uses, such as alternative crops, ecosystem restoration and wildlife recreation.
- Addresses the fact that, once the size of the problem is reduced to 94,692 acres, the Corps' plan for a 650-mile regional water distribution system, costing more than $230 million for only 94,692 acres, would cost taxpayers more than $2,428 per acre.
- This alternative is estimated to cost less than half the Corps' proposal.

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Background

The lower White River, in Arkansas, is an international treasure, as it is home to an extensive network of wildlife. Annually, it draws researchers, tourists, and recreationists around the world. The White River National Wildlife Refuge is the largest remaining functional bottomland hardwood ecosystem on any tributary of the Mississippi River. This ecosystem supports the largest wintering population of mallards in North America, as well as the only native population of black bears in Arkansas. The White River ecosystem has been designated by the international Ramsar Convention as a "wetland of international importance," alongside national treasures such as the Everglades and the Okefenokee Swamp. The White River is home to more than 100 species of fish and 45 species of mussels, including several endangered mussels, and is one of the most diverse aquatic systems in the nation.

Agricultural irrigation is responsible for about 89 percent of annual groundwater withdrawal in Arkansas' Grand Prairie region. The agricultural community has known since 1927 that the collective rate of irrigation water withdrawal from the alluvial aquifer--the major source of ground water across the Delta--is unsustainable. Nonetheless, irrigation continues to expand across Arkansas (Figure 1) at the second-highest rate in the nation (NRCS National Resources Inventory: 1997). This deficit use of Arkansas' abundant, but limited and

declining, water supply has enabled Arkansas to become the top rice-producing state in the U.S....at a price.

The Arkansas Soil and Water Conservation Commission (ASWCC) estimates that portions of the alluvial aquifer may be irreversibly depleted in the Grand Prairie by 2015. That ground water depletion is a very real problem in several areas of eastern Arkansas is undisputed.

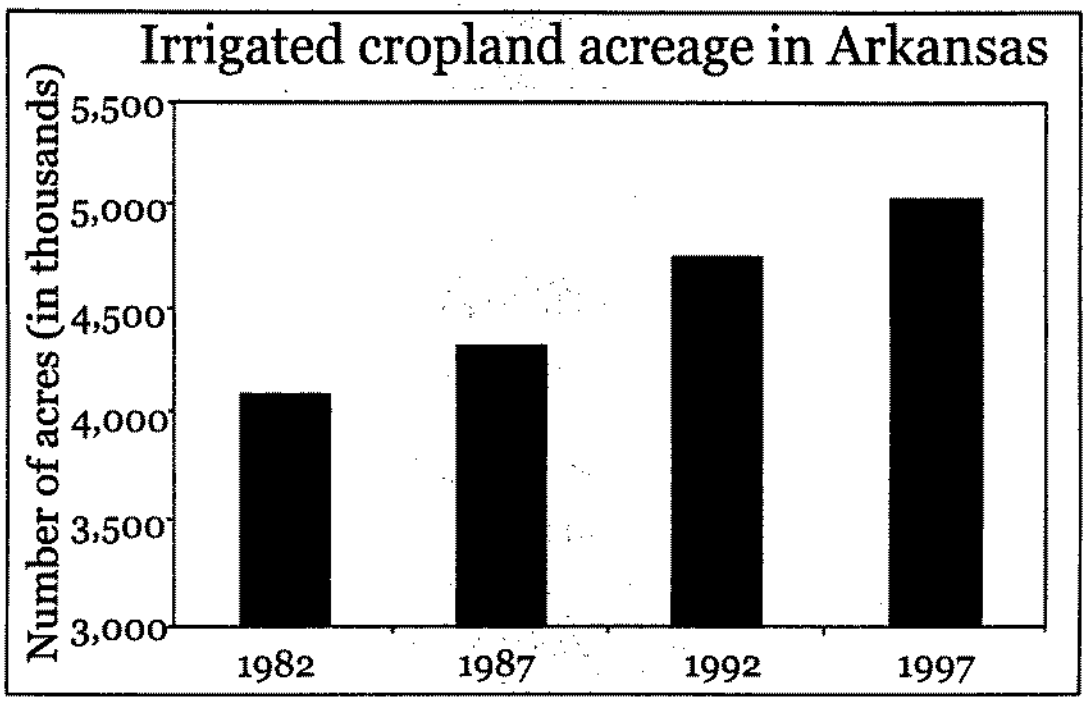

Figure 1

Production of rice, a high-water-demanding crop, across Arkansas has increased three-fold since 1970, from about 0.5 million acres to about 1.5 million acres (Figure 2). Currently, Arkansas is the top rice-producing state in the U.S., with about 42 percent of the nation's rice harvest. In the U.S., especially Arkansas, rice growers have been so successful that they have contributed to a surplus-driven economic slump. Nationally, rice production is increasing, while average season prices are declining. Furthermore, taxpayer subsidies have risen to record levels to support farm income.

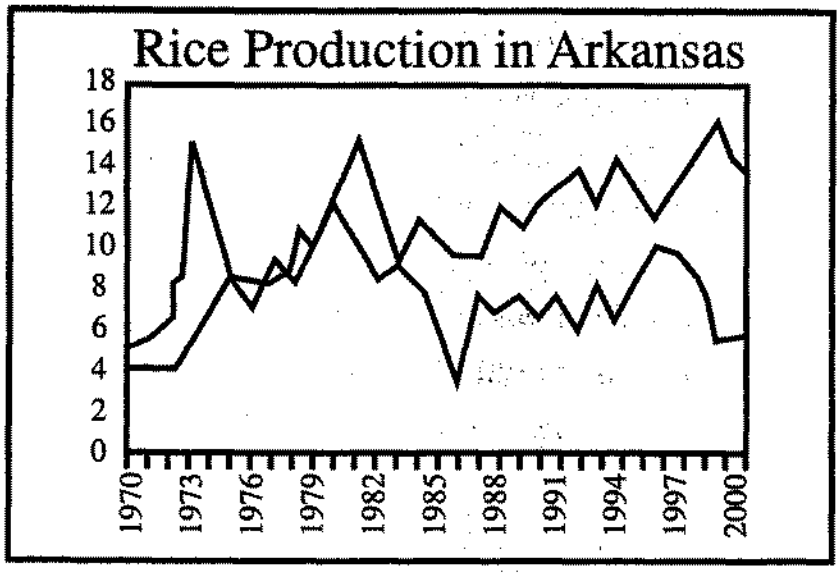

Figure 2. Number of acres of rice harvested in Arkansas (black line) and season average price in dollars per cubic weight tons (blue line), between 1970 and 2000 (USDA Statistics Report: 2000).

Fundamentally, Arkansas cannot sustain 1.5 million acres of rice production. Likewise, rice production on the Grand Prairie is unsustainable, as demonstrated by the very fact that the Unites States Army Corps of Engineers (Corps) proposes to tap and compromise yet another source of irrigation water.

Although eastern Arkansas averages about 49 inches of rainfall annually, water remains limited. Competition for water is growing throughout the White River basin. Municipalities, agriculture, ecosystems, navigation, industry and recreation all need the same water.

The GPADP is labeled a "demonstration project" for two reasons. First, irrigation is not a traditional mission of the Corps. Second, because the Corps considers irrigation to be a growth opportunity, the GPADP is intended to prove that the Corps can plan and implement major irrigation projects. The ramifications are vast. In Arkansas alone, there are at least 13 irrigation projects proposed (Figure 3). Three would divert water from the White River or its tributaries, in addition to the water being diverted by the GPADP. If completed, this array of irrigation projects would cover vast areas of Arkansas' agricultural land in the Delta, the Arkansas River Valley and the Red River Valley, effectively re-plumbing the state's agricultural watersheds.

White River Basin
Grand Prairie Area Demonstration Project
Little Red River Irrigation Project
White River Irrigation Project
Black River Irrigation Project
Little Red River PL-566 Irrigation Project
L'Anguille River PL-566 Irrigation Project
Bayou DeView PL-566 Irrigation Project
Northern Prairie County PL-566 Irrigation Project

Arkansas River Basin
Bayou Meto Irrigation Project
Boeuf-Tensas Irrigation Project
Point Remove Irrigation Project

Red River Basin
Walnut Bayou Irrigation Project
Maniece Bayou Irrigation Project

Figure 3. Arkansas' Irrigation Projects: proposed, planned or in progress

Because irrigated acreage continues to increase in the Mississippi Delta (Figure 4), Arkansas' water problems are inevitable in other Delta states. Arkansas' response to this challenge is certain to become a model throughout the Delta.

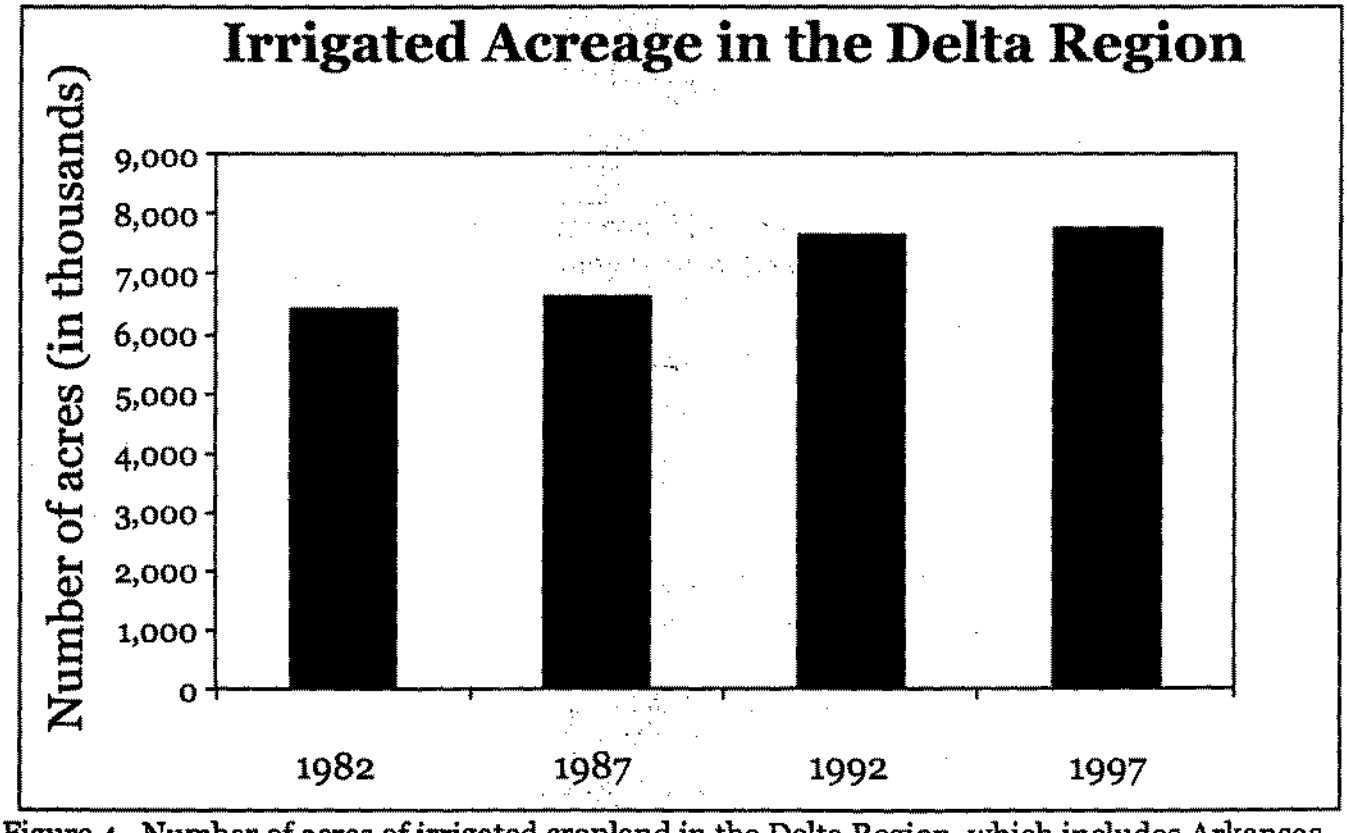

Figure 4. Number of acres of irrigated cropland in the Delta Region, which includes Arkansas, Louisiana, and Mississippi, from 1982-1997 (USDA-NRCS National Resources Inventory: 1997).

Corps' Proposal

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- The Corps' proposal would:
  - build a pumping plant on the White River to remove 1,640 cubic feet per second of water (1.06 billion gallons/day, 115 billion gallons/year);
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  - increase irrigation efficiency modestly, from 60 percent to an optimized 70 percent;
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  - cost $319 million—$367,935 per farm or $1,525 per irrigated acre;
  - still require a 15.6-percent decline in irrigated acreage; and
  - meet none of its major objectives, including preserving the alluvial aquifer.
- The GPADP also would:
  - buttress near-record commodity surpluses;.
  - suppress already-low commodity prices;
  - hamper farmers' ability to earn enough profit from their yields to stay in business; and
  - further compound problems with the nation's agricultural economy.
- Almost half of the farmers—the would-be beneficiaries—in the area oppose the project.

The Corps' $319 Million Proposal

The Corps—with the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), the ASWCC and the White River Regional Irrigation Water Distribution District (WRID)—has approved a two-part project. The Corps is the lead agency for planning and building a regional supplemental water supply system that would build a pumping station to draw 1,640 cubic feet per second (1.06 billion gallons/day) of water from the White River. The project would also include the installation of 10-foot-diameter steel pipes to carry diverted water 1.7 miles to a holding reservoir, a 650-mile regional water distribution system and at least 120 in-stream weirs.

NRCS would be the lead agency for planning and implementing a concurrent on-farm effort to enhance water conservation and storage. The on-farm portion would be composed of an optimized combination of water conservation features and water storage facilities. NRCS would oversee installation of 8,849 acres of on-farm irrigation storage reservoirs, to hold the supplemental water, as well as tailwater recovery structures and other irrigation technologies to recycle water, while modestly reducing water losses and waste. The project would optimize irrigation efficiency across the Grand Prairie, from the current 60-percent average efficiency to 70-percent efficiency.

The Corps claims that environmental enhancement is featured prominently in the project. The GPADP proposes to provide up to about 38,000 acres of winter-flooded, harvested rice fields for waterfowl, permanently-pooled water behind weirs in existing streams for fish, and additional permanent water in on-farm reservoirs and irrigation canals. Finally, the Corps asserts that native prairies will be restored. The reality, to the contrary, is that irreversible compromises to the incomparable White River ecosystem would be traded off for artificial environmental features that provide marginal ecological benefits, at best.

Of the GPADP's $319 million cost, about $208 million (65 percent) would be paid by U.S. taxpayers. The remaining $111 million will be paid by Arkansas taxpayers and project beneficiaries. For comparison with other well-known and controversial Corps projects, the White River Navigation Project costs $30 million, and the Yazoo (Mississippi) Pumps Project costs less than $200 million.

The Grand Prairie should be used within its sustainable limits, rather than re-engineered to meet desires for unsustainable, intensive, short-term use.

The Corps' Objectives versus Reality

Even if the GPADP is implemented exactly as proposed, the project is unlikely to meet any of its major objectives, as stated in the Main Report (41)*. The Corps' study-specific objectives, listed below, are contrasted by likely realities.

Objective: Protect and preserve the alluvial aquifer.

Reality: The GPADP would take no steps to manage, regulate or protect the alluvial aquifer or to prevent unsustainable groundwater withdrawals from continuing. The project provides zero assurances that the alluvial aquifer will stabilize, much less recharge. Farmers can and will continue using existing wells, drilling new wells and pumping groundwater at unsustainable rates, despite the project. Unless the state of Arkansas accepts its legal authority and stewardship responsibility to manage groundwater, unsustainable levels of pumping from the alluvial aquifer will continue.

Objective: Provide a supplemental water supply to meet the irrigation water needs of the Grand Prairie.

Reality: The GPADP will not meet the Grand Prairie's current irrigation demands. Even if implemented exactly as proposed, the GPADP will meet only 87.6 percent of the average annual water demand for the project area, according to the Corps' own analysis (65). A planned average water shortfall of 59,791 acre-feet (86), would leave at least 30,820 acres of currently irrigated cropland vulnerable to frequent shortages (59,791 acre-feet /1.94 acre-feet per acre, current demand at 60-percent efficiency). In other words, even after spending $319 million, the GPADP would provide enough water to irrigate the entire project area only 57.4 percent of the time, or 27 out of 47 years (65).

* All references to the Main Report refer to the United States Army Corps of Engineers' *Eastern Arkansas Region Comprehensive Study, Grand Prairie Area Demonstration Project, General Reevaluation Report*, February 2000, Memphis, TN.

Possible consequences of the Corps' planned water shortfall include:

- Some cropland converting to dryland farming (86);
- Lack of some rice flooding for winter waterfowl (86);
- Continuing of overdraft from the alluvial aquifer; and
- More water being pumped from White River than promised.

Over time, it is likely that more water would be pumped from the White River than predicted by the Corps. The state's minimum flow assurances and the Corps' pump cut-off levels are only as effective as the subsequent political will to honor and enforce them. Agricultural and political realities compel a reasonable assumption that the next drought will generate such political pressure as to cause the state's minimum flows and the Corps' pump cut-off levels to be weakened or waived, to provide desired irrigation water.

Objective: Maximize the use of conservation.

Reality: The GPADP plans to optimize--rather than maximize--the use of conservation, to modestly increase irrigation efficiency from 60 percent to only 70 percent. This optimum goal of waste reduction was determined for the Corps' benefit: cost analyses that assumed no need to eliminate all waste because a pump and distribution system would provide supplemental White River water. Affordable technology already is available to increase average irrigation efficiency to at least 80 percent.

Objective: Enhance fish and wildlife habitat.

Reality: The benefits to fish and wildlife habitat are overstated. The 38,000 acres of flooded, harvested rice fields promised for ducks are:

- unneeded—the acreage objective for this habitat type under the North American Waterfowl Management Plan is nearly met in Arkansas;

- low-grade habitat—compared to natural foods--waste rice is a high-energy but low-quality food, that is now known to be less abundant and available than once thought; and
- achievable without the GPADP—the Arkansas Partners Project and the Arkansas RICE Project has been highly successful in convincing and assisting rice farmers to voluntarily flood rice fields in winter, to attract ducks and generate extra revenue from hunting leases.

Furthermore, the project's purported fish habitat enhancement would consist only of marginal ecological benefits from permanent water pooled behind project weirs in existing water-conveyance streams, new on-farm reservoirs and new canals. These artificial habitats might benefit common, generalist fish species, but not the diverse community of species now in the White River, which would be subjected to increased risk during longer-duration, low-flow regimes.

Objective: Restore native prairies.

Reality: The GPADP has merely committed to conduct an "experimental planting" of native grasses and possibly some prairie forbs, instead of the usual tame grasses such as fescue and bermudagrass. These plantings will occur, not in the large blocks of quality prairie habitat needed to attract true grassland wildlife, but in strips along the canal banks and rights-of-way. Theoretically, the project could provide up to 3,000 acres of native plants. However, because the Corps acknowledges "prairie restoration can be costly and time-consuming," the results of the experiment "will be used to ascertain the feasibility and amount of restoration practical" (46).

Objective: Minimize cost and maximize outputs.

Reality: A $319 million project proposal that does not meet any of its objectives is a failure.

Sustainable Alternative

- The sustainable alternative endeavors to use the Grand Prairie within its sustainable water limits, rather than re-engineer this unique area to buttress and temporarily extend unsustainable uses.
- This alternative highlights the reality that—when confronted with critical, long-term water shortages—it is wiser to spend money to save water, than to waste water to save money.
- The sustainable alternative
  - does not exploit the White River;
  - maximizes (instead of optimizes) irrigation efficiency, to 80 percent or higher from 60 percent;
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- Addresses the fact that, once the size of the problem is reduced to 94,692 acres, the Corps' plan for a 650-mile regional water distribution system, costing more than $230 million for only 94,692 acres, would cost taxpayers more than $2,428 per acre.
- This alternative is estimated to cost less than half the Corps' proposal.

The Sustainable Alternative

This alternative addresses the problem of groundwater depletion *at its source, rather than at its symptoms*. The source of the problem of groundwater depletion in the Grand Prairie is the unsustainable water demand for irrigation. Agriculture accounts for about 89 percent of the area's annual groundwater withdrawals from the alluvial aquifer. A viable, long-term solution that achieves water sustainability must begin by making every effort to reduce demand. Any other approach—such as getting more water—addresses the symptoms, but compounds the problems. The Grand Prairie should be used within its sustainable limits, rather than re-engineered to meet desires for unsustainable, intensive, short-term use.

Current rice production on the Grand Prairie is unsustainable and must decline, even if the GPADP is constructed as proposed. This unpopular fact is acknowledged by the Corps, the NRCS, the ASWCC and the WRID. By planning to provide irrigation water for only 209,046 acres of the project area's 247,556 currently irrigated acres (64-65), project proponents already have accepted that a 15.6-percent reduction in irrigated agriculture on the Grand Prairie is socially acceptable and does not constitute a lethal blow to Arkansas' rice industry. On the other hand, proponents hold that a 75.6-percent reduction in irrigated agriculture on the Grand Prairie (the no-action result) is an unacceptable impact to the rice industry's critical mass (e.g., 23, 25).

The realities of the unsustainability of current water use and the imminent change on the Grand Prairie have been acknowledged. Irrigated agriculture on the Grand Prairie must decline at least 15.6 percent, but no more than 75.6 percent. The remaining question is: what is the "magic number" for reducing irrigated agriculture, that achieves sustainability on the Grand Prairie without fatally undermining Arkansas' rice industry?

This sustainable alternative utilizes the Corps' own data and analyses to construct an alternative approach. This approach leaves the White River alone, needs no pumping station or water delivery system, maximizes wise use of limited water resources, and recommends public assistance to reduce irrigated acreage to sustainable levels. This alternative follows a three-step strategy, in order of priority, and is followed by a chart, entitled, "The Shrinking Problem," which illustrates how these measures reduce the size of the Grand Prairie's irrigation problem to a manageable level, eliminating any need for a pumping station on the White River.

Step 1: Maximize irrigation efficiency to at least 80 percent.

The sustainable alternative places its highest priority on making the absolute best use of existing water conditions by maximizing conservation. The Corps acknowledges that "conservation yields the most return for the dollar invested" (50).

The current average irrigation efficiency across the Grand Prairie is estimated at 60 percent (43). Of every 100 gallons obtained by farmers, 60 gallons reaches the crops and 40 gallons are lost. At this efficiency level, 481,195 acre-feet of water are required annually to irrigate the 247,556 acres of cropland in the GPADP project area (64), an average of 1.94 acre-feet per acre. The GPADP currently proposes to increase irrigation efficiency only to the "optimal" level of 70 percent because achieving higher effeciency would cost more.

The alternative asserts that it is wiser, in the long term, to spend money to save water than to waste water to save money. It is technically and fiscally feasible to achieve at least 80-percent irrigation efficiency across the Grand Prairie. If the GPADP aimed for 80-percent efficiency, a total of 360,896 acre-feet of water would be needed per year, a reduction in water demand of 120,299 acre-feet (25 percent). At 80-percent irrigation efficiency, only 1.46 feet of water is needed per acre, on average (360,896 acre-feet/247,556 acres). (Figure 5)

Average irrigation efficiency	Project area water demand (acre-feet)	Per acre water demand (acre-feet/acre)
60 percent (current level, GPADP)	481,195	1.94
70 percent (GPADP proposal)	412,453	1.67
80 percent (Sustainable Alternative)	360,896	1.46
85 percent (innovative possibility)	339,667	1.37
90 percent (possibly in future)	320,797	1.30
100 percent (actual need of current crops)	288,717	1.17

Figure 5. Effects of changes in average irrigation efficiency on project area and per acre water demand

By achieving 80-percent irrigation efficiency, the 40,000 acre-foot sustainable yield of the alluvial aquifer can be stretched to meet the irrigation needs of 27,397 acres
(40,000 acre-feet ÷1.46 acre-feet/acre = 27,397 acres).

Step 2. Maximize on-farm water storage.

On-farm irrigation storage reservoirs enable farmers to become hydrologically self-reliant. Reservoirs enable farmers to capture and store available water during wet seasons, to be used later for irrigation. These structures also providethe ability to store and recycle excess irrigation tailwater. If placed on cropland instead of wetland or streamcourses, reservoirs can reduce water demand by taking irrigated land out of production. Finally, reservoirs on cropland are strongly supported by conservationists, who would staunchly oppose placing the same structure on wetlands or streamcourses.

The Corps' analysis of on-farm storage raises as many questions as it answers. The project area currently supports 15,556 acres of on-farm irrigation storage reservoirs (68). The Corps purports (31) to use the measurement of 8 feet as an average depth to calculate the volume of existing storage, which should estimate 124,448 acre-feet of storage capacity. However, the Corps actually used 5.43 feet as an average depth in its calculations, resulting in their estimate that existing reservoirs have a storage capacity of 84,525 acre-feet (44, 68). Finally, the Corps cannot determine whether the existing reservoirs provide all 84,525 acre-feet (44) or only 73,188 acre-feet (68).

This alternative deals with these discrepancies in two steps. First, the most conservative Corps estimate of 73,188 acre-feet is shown to provide water for 50,129 acres, at 80-percent irrigation efficiency (73,188 acre-feet ÷ 1.46 acre-feet/acre = 50,129 acres). Second, this alternative takes the Corps at its word that existing reservoirs already have a storage capacity of 8 feet average depth or could be upgraded to 8 feet. Thus, at 80-percent efficiency, an additional 27,383 acres could be irrigated by the extra 39,979 acre-feet of storage capacity (39,797 acre-feet ÷ 1.46 acre-feet/acre = 27,383 acres). If existing reservoirs already are 8 feet average depth, the $9.5 million cost to upgrade them is eliminated.

According to the Corps' plans, all new irrigation reservoirs will be 10 feet average depth and will provide 10 acre-feet of water per acre of reservoir. For example, 8,849 acres of planned new reservoirs could provide 88,493 acre-feet of water (44, 68). Every 1,000 acres of new reservoirs takes 1,000 acres of cropland out of production, and eliminates 1,000 acres of irrigation water demand. The Corps clearly states that all reservoirs will be located on cropland (31, 44, 68). Also, every 1,000 acres of new reservoirs will provide 10,000 acre-feet of irrigation water, that will meet the needs of 6,849 acres of cropland at 80-percent efficiency (10,000 acre-feet ÷ 1.46 acre-feet/acre = 6,849 acres). Therefore, every

1,000 acres of new reservoirs can reduce the project area's water demand by the equivalent of 7,849 acres (1,000 acres + 6,849 acres = 7,849 acres).

Without supplemental water from the White River, the Corps estimates that a maximum of 1,379 acres of new reservoirs can be supported by the project area watersheds (69). Conservationists believe this estimate is very conservative and that, by capitalizing on abundant surface water available during winter, additional reservoirs could be functional. Independent analysis of this aspect of the project area's watersheds is warranted. If the project area will support an additional 1,000 acres of reservoirs, the irrigation needs of another 7,849 acres will be addressed (1,000 acres removed from production + 6,849 acres supplied with water). Or, if the project area actually will support an additional 5,000 acres of on-farm reservoirs, the water demand of 39,247 acres of cropland will be addressed (5,000 acres removed from production + 34,247 acres supplied with water).

Step 3. Convert the unsustainable cropland to less-water-intensive uses.

Several options are or can be available to farmers to convert irrigated cropland to less-water-intensive uses. Switching to less water-demanding rice, or dryland farming are the logical first choices. For example, new rice varieties are becoming available that are herbicide resistant and require less water. Because weed control is a major reason rice requires so much water, herbicide-resistant varieties facilitate weed control without flooding.

USDA's Wetlands Reserve Program (WRP) and Conservation Reserve Program (CRP) are ideal models for this situation. These programs are intended to retire marginal, surplus or unsustainable cropland to convert it to less-intensive, conservation uses. These programs are popular with farmers because they are voluntary programs that pro-

vide fair compensation from taxpayers for the public environmental and agricultural benefits obtained. WRP costs taxpayers about $1,000 per acre in Arkansas, of which about $700 per acre goes to the landowner as an incentive. Although WRP has exhausted its current authority and is oversubscribed and underfunded, it remains an ideal model for a special program that could be authorized and targeted for the Grand Prairie.

Farmers who choose to enroll in WRP or CRP retain ownership and control of their property and can continue to make certain economic uses of the property. For example, recreational income from hunting leases or trespass fees is a thriving industry in the Grand Prairie and elsewhere in Arkansas. In the Grand Prairie, duck blinds typically lease for around $5,000 per season, and deer hunting leases earn about $2-3 per acre per season. Finally, timber management is a viable long-term revenue opportunity that can be pursued on both WRP and CRP land.

More creatively, because much of the Grand Prairie consisted of native tallgrass prairie prior to rice culture, vast opportunity exists to promote bona fide prairie ecosystem restoration. Such efforts could accelerate the recovery of northern bobwhites and other upland game species, and eventually could even allow for restoration of greater prairie chickens to Arkansas.

The Shrinking Problem

The actual magnitude of the irrigation problem on the Grand Prairie is far smaller than portrayed by the Corps. This analysis is based on the Corps' own studies and analyses, as published in the Eastern Arkansas Region Comprehensive Study, Grand Prairie Area Demonstration Project, General Reevaluation Report. Most numbers are taken straight from the first volume of the Main Report or are re-calculated from numbers originating in the same.

Acres

362,662	The total project area evaluated by the Corps' General Reevaluation Report.
-115,106	Acres within total project that are not irrigated cropland (11).
247,556	Subtotal, acres of currently irrigated cropland within the total project area.
- 38,510	Acres of currently irrigated cropland the Corps would convert to reservoirs (8,849 acres) or to "dryland" farming, even if GPADP is implemented as planned, since there will be a 59,791 acre-foot average shortfall (64). The Corps plan would provide irrigation water for only 209,046 acres, 84.4 percent of currently irrigated acreage (65, EIS-30). If the Corps is willing to disregard these acres, this alternative need not address them.
209,046	Subtotal, acres that the sustainable alternative needs to address.
- 27,397	Acres irrigatable at 80-percent efficiency, by the alluvial aquifer's sustainable yield, 40,000 acre-feet divided by 1.46 feet per acre equals 27,397 acres, (Vol.3, App. B, Sec. I, p. IV-5).
181,649	Subtotal, acres remaining to address
- 9,445	Acres irrigatable by the 1,379 "maximum" acres of new reservoirs the Corps estimates are possible without a supplemental water supply (69), at 10 feet average depth and 80-percent efficiency (13,790 acre-feet / 1.46 acre-feet per acre = 9,445 acres).
172,204	Subtotal, acres remaining to address
- 50,129	Acres irrigatable by the existing 15,556 acres of on-farm irrigation storage reservoirs, at 5.43 feet average depth and 80-percent efficiency. Of the 84,525 acre-feet total storage capacity, at least 73,188 acre-feet are available for irrigation (44, 68), 73,188 acre-feet divided by 1.46 acre-feet per acre, at 80-percent efficiency equals 50,129 acres (68).
122,075	Subtotal, acres remaining to address
- 27,383	Additional acres irrigatable by the existing on-farm irrigation storage reservoirs, assuming the average depth is 8 feet. At 80-percent efficiency, 39,979 acre-feet divided by 1.46 acre-feet per acre equals 27,383 more irrigatable acres.
94,692	The actual, maximum size of the Grand Prairie's irrigation problem.

Innovative Options

"The Shrinking Problem" worksheet demonstrates that the actual size of the Grand Prairie's irrigation problem is, at most, only 94,692 acres. To solve this problem with a $230 million pump and regional distribution system would require taxpayers to spend $2,428 per acre, in addition to the money already spent to promote irrigation efficiency and on-farm storage. The alternative proposes to address this remaining problem with an ecologically and fiscally defensible array of innovative measures.

- The Conservation Reserve Program (CRP) and the Wetlands Reserve Program (WRP) were designed for just such situations as the Grand Prairie, where marginal, surplus or unsustainable cropland is available that landowners may be willing to retire, with adequate incentives. Both proven programs could be earmarked to apply directly to this project, or variants of the two popular programs could be created for this specific application. To voluntarily retire 50,000 acres of the unsustainable cropland under the WRP and to restore natural prairie or bottomland hardwood habitat would cost only $50 million.

- Reduce waste of water even further by making every effort to exploit emerging, cost-effective, irrigation-efficient technology and evolving best management practices, to boost irrigation efficiency to 85 percent, instead of just 80 percent. By making this 5-percent addition, the water sources proposed in this alternative could be stretched to irrigate another 10,541 acres.

- Maximize new, on-farm irrigation storage reservoirs, beyond the 1,379 acres the Corps estimates to be feasible without a supplemental water supply. For example, by aggressively monitoring, capturing and storing abundant runoff water during winter months, more reservoirs may be feasible. If the project area watersheds will support an additional 1,000 acres, which would provide 10,000 acre-feet of irrigation water, the irrigation demand of another 6,849 acres, at 80-

percent efficiency, will be addressed. At 85-percent efficiency, the 10,000 acre-feet would irrigate 7,299 acres

Extra Reservoirs (acres)	Acres addressed at 80-percent efficiency	Acres addresssed at 85-percent efficiency
1,000	6,849	7,299
2,000	13,698	14,598
5,000	34,246	36,496

Figure 7. Acres of irrigation demandaddressed by potential new storage reservoirs .

- Reduce the bottom line water demand by switching to experimental rice varieties that require less water, such as the new *Clearfield Rice* that is herbicide tolerant. Because weed control is a major reason rice requires so much water, herbicide-resistant varieties allow better weed control without flooding.

- Provide public incentives to directly reduce irrigation water demand, such as purchasing short- or long-term "no irrigate" agreements with willing farmers. The state of Georgia currently is experimenting with this approach. Stakeholders there have achieved a functional level of concurrence among farmers, conservationists and politicians, resulting in the state's first-ever bidding process to purchase one-year, "no irrigate," voluntary agreements with farmers. This program costs Georgia about $140 per acre during the first year of implementation.

- The federal government and agribusiness should place highest priority on and funding into agricultural research to reduce irrigation water demand. Numerous avenues exist by which to pursue this goal, including improved crop varieties, more efficient irrigation technology, best management practices and other creative opportunities. Theperiod between the present and the 2015 predicted depletion of the alluvial aquifer is ample to make substantial technical progress.

Other Possibilities via Discrepancies

- The total project area in the Corps' General Reevaluation Report for the GPADP is 362,662 acres, of which 247,556 acres are irrigated cropland (46). Following the signing of the Record of Decision by the Corps' Division Commander, on February 25, 2000, the WRID commenced an intensive effort to meet the state requirement for signatures from 50 percent + 1 of the landowners in the project area. Upon realizing that only a minority of landowners supported the project, the WRID began—in Spring 2000—carving out major pockets of land—and landowner opposition—from the project area. By the time the project area had been gerrymandered enough to achieve majority support from the remaining landowners, the project area had been reduced by one-third, to an unofficial total of 241,000 acres, with an unknown acreage of irrigated cropland. Thus, the actual magnitude of the remaining irrigated cropland problem in the GPADP may be substantially smaller than the 94,692 acres calculated in this alternative.

- The Corps claims that the existing 15,556 acres of on-farm irrigation storage reservoirs are an average depth of 8 feet (31), yet calculates the storage capacity of these existing reservoirs using an average depth of 5.43 feet (68). This sustainable alternative assumes that, if 5.43 feet is the actual, current, average depth, the reservoirs could be upgraded to an average depth of 8 feet by excavation or raising the levees. If the reservoirs already are 8 feet deep, the $9.5 million upgrade cost would be saved.

- The Corps states that the existing 15,556 acres of on-farm reservoirs have a capacity of 84,525 acre-feet and that the entire volume is available for irrigation (44). Elsewhere, the Corps states that only 73,188 acre-feet of the 84,525 acre-feet total volume are available for irrigation use (68). This alternative took the conservative step of using the

smaller number in "The Shrinking Problem" worksheet. If the entire volume actually is available for use, or could be made available, per the Corps' statement on page 44, the extra 11,337 acre-feet difference would be sufficient to irrigate another 7,765 acres, at 80-percent efficiency, or another 8,275 acres at 85-percent efficiency.

The Corps claims that the sustained yield of the alluvial aquifer is 35,574 acre-feet (e.g., 23). Elsewhere in the General Reevaluation Report regarding the Peralta groundwater model, the Corps states that the sustainable yield of the alluvial aquifer is 40,000 acre-feet per year (Vol.3, App. B, Sec.I, p. IV-5). In stark contrast elsewhere in the main report, the Corps cites an annual recharge rate for the alluvial aquifer of 100,000-130,000 acre-feet per year (68). The 35,574 to 40,000 acre-feet range for sustainable yield appears quite inconsistent with an annual recharge rate of 100,000 to 130,000 acre-feet per year. Thus, the actual sustainable yield of the alluvial aquifer could be substantially higher than the 40,000 acre-feet used in this alternative.

Estimated costs of sustainable alternative

	Total Cost	Federal Cost (65% cost-share)
Irrigation Efficiency (from 60 to ~80% on 148,600 ac)		
Tailwater recovery	$16,717,500	$10,866,375
Underground pipe	$34,326,000	$22,312,290
Multi-inlet pipe	$14,860,000	$9,659,000
Reservoirs, new	$3,971,520	$2,581,488
Reservoirs, upgraded	$9,594,941	$6,236,712
Totals	$79,470,561	$51,655,865

Estimated costs of innovative options

	Total Cost	Federal Cost (65% cost-share)
Wetlands Reserve Program	$50,000,000	$50,000,000
Reservoirs, new (5,000 potential additional acres)	$14,400,000	$9,360,000
"No-irrigate" agreement	$14,624,400	Not applicable

Comparison of total costs

Grand Prairie Area Demonstration Project	$319,000,000
Sustainable Alternative	$158,000,000

Conclusion

The White River is a national and international treasure that would be permanently and irreversibly compromised by the Grand Prairie Area Demonstration Project. Further, the Corps' $319 million unsustainable proposal would launch Arkansas into a new era of subsidized, large-scale, intensive irrigation projects that would tap, divert and compromise several of the state's publicly owned rivers. The GPADP, if implemented, would pave the way for at least 12 other irrigation projects across Arkansas that, ultimately, would re-plumb the landscape and the water resources of the state's agricultural regions. Such massive engineering projects, at best, provide only short-term remedies for the symptoms of the deeper, larger problems of unsustainable water demand and land use. At worst, such projects solve no identified problems, while creating and compounding other problems, at tremendous costs to taxpayers and natural resources. The sustainable alternative provides Arkansas and the nation an opportunity to choose a long-term solution at less than half the cost. It is time for Arkansas to begin aligning agricultural and societal uses of the Grand Prairie with the land's inherent capacity to sustain itself.

STATEMENT OF
T. DAVID CARRUTH
May 16, 2001

Paralleled only by such other bad public works projects as the Cache River/Bayou DeView Drainage Project, The White River Navigation Project and damming the Buffalo River, the Grand Prairie Area Demonstration Project stands as the most controversial public works project currently under consideration by the U. S. Army Corps of Engineers.

In partnership with the Arkansas Soil and Water Commission and the White River Irrigation District, over $48 million taxpayer dollars have been spent on the project since 1992 while achieving less than 5% of the projects goals.

In the last 4 years alone, approximately $14 million has come from the coffers of the State of Arkansas in the form of **grants** to the

White River Irrigation District in Stuttgart.

Where does this money come from? Who bears this cost? The answer is simple. ***The people of Arkansas!*** From Bentonville to Lake Village, from Blytheville to Texarkana, ever citizen in Arkansas will bear the cost of this and other irrigation projects for which the Grand Prairie Project serves as a demonstration. Every student in every public school, every student at a state supported college or university who has to pay higher tuition, every teacher who seeks a pay raise, every library that has to cut back for lack of funds, every recipient of assistance from the Department of Human Services will pay so that these "grants" can continue to flow from the Arkansas Soil and Water Commission. And all without prior approval from the legislature or governor.

How can such things happen? As a result of <u>Referred Question No. 1 of 1998,</u> the Arkansas Soil and Water Commission has authority to issue up to $300,000,000.00 of general obligation bonds in the name of the State. The issuance of these bonds is solely within the control of the Soil and Water

Commission and is not subject to approval of the legislature or the governor.

Not only does Soil and Water have the authority to issue these bond, from documents obtained in its files, it is clearly the intent of Soil and Water to "grant" over $64,000,000.00 raised from the sale of the bonds to the Grand Prairie Project alone.

You would think that the landowners that are to receive benefits of this magnitude would welcome it; however, over 30% of the purported beneficiaries want out.

I AM HOLDING IN MY HAND petitions signed by 377 landowners in the White River Irrigation District dating back as far as 1995 asking the Prairie County Circuit Court to remove their land from the Irrigation District. Action on these petitions was put on hold at the request of the WRID to give the Corps of Engineers time justify this project to these landowners. Many of the landowners wanted assurance that the project will solve the problem while not burdening their land with excessive debt. 6 years later, the Corps still cannot justify the project and give these

landowners that assurance.

Instead, the White River Irrigation District undertook to re-form the district by creating an Improvement Project Area. This resulted in the now infamous petition drive of approximately a year and a half ago where the WRID attempted to obtain 50% of the landowners signature and 50% of the assessed value in order to form up a different district. Even this failed to gain sufficient support and resulted in even more controversy and horrendous waste of taxpayer money. For example, between June and August of 1999 the White River Irrigation District paid one David Bickerstaff, $25,000.00 plus expense for him to "***secure the signatures of landowners for the formation of an Improvement Project Area***." The Agreement signed by Mr. Bickerstaff and Mr. Gene Sullivan goes on to state, "***In the event sufficient signatures are obtained to form the Improvement Project Area, a $5,000.00 bonus will be paid to Bickerstaff.***" Another example of this horrendous waste is the payment of $1,500.00 plus expenses each month to a registered lobbyist to

provide "political consulting services" to the WRID. Taxpayer money to pay a lobbyist?

All of this for a project that:

(1) The Corps or Engineers admits is only 86% reliable,

(2) Has had an increase in its cost projection of $49,000,000.00 in less than 2 years,

(3) Will result in 30,000 to 40,000 acres of cropland on the Grand Prairie having no water for irrigation purposes; and if constructed,

(4) Will give the Arkansas Soil and Water Commission the ability to make farmers cease pumping from their ground wells.

Controversy,
Rapidly increasing cost projections,
Massive waste of taxpayer dollars.
Questionable expenditure of state funds,
Inability to achieve the objective,
Lack of support,
Misinformation and unrealistic costs projections.

All of these are characteristics of the Grand Prairie Area Demonstration Project proposed by the Corps of Engineers, Arkansas Soil and Water and the White River Irrigation District.

Fortunately an alternative exists. An alternative based on good science and objective analysis. Don McKenzie, with the assistance from other organizations, has spent most of the past year, analyzing the data and reports produced by the Corps of Engineers for the Grand Prairie Irrigation Project. The report that he presents to you today is the culmination of that work.

Having been a part of the Dickey Compromise and member of the Oversight/Review Committee, I can tell you unequivocally, that Don's work is exactly what was envisioned by that Agreement. It uses all the "tools in the toolbox" to make better use of the available water, ***maximize*** instead of *optimize* irrigation techniques and practices for water management and retires marginal land from production. It achieves all of the objectives necessary to bring a

sustainable solution to aquifer depletion at less than half the cost and, without pumping from any river. It also leaves control of irrigation water with the landowners, not with a bureaucratic entity such as the White River Irrigation District.

Recently, I have received unconfirmed reports that the Corps is reviewing the reliability aspect of their proposal. Additionally, it has been reported that the Corps is now considering removing up to 50,000 acres of Grand Prairie land from production. These 50,000 +/- acres would be used for ecosystem restoration to make the project more "environmentally friendly" or acceptable. If this is true, I find it more than coincidental that such action comes at this time. Especially in light of the fact that the Corps stated in December of 2000 that the original plan was the only way to address the problem.

I encourage you to look at the number and diversity of those who have endorsed Don's alternative. Coupled with the

ponents of the compromised presented Jerry Lee Bogard and International Paper a year ago and, the number of ndowners who have petitioned to be moved from the District, the overwhelming magnitude of the opposition to the Corps plan is clear. It should be equally clear that the plan presented to you today by Mr. McKenzie is a responsible, sustainable solution to the problem.

Responsible in that it does not incorporate diversion of any stream for agricultural use. Over $230 million of the $319 million the Corp proposes to spend on the project would be spent on a system of pumps and canals to divert the White River to the Grand Prairie. The operative word is "divert". Instead of finding a solution to the problem, the Corps proposal takes the water resources of the White River basin and "re-allocates" them away from hunters, fishermen and sportsmen to agriculture.

The clearest example of this is flooding of rice fields for hunting with White River water. The White and Cache River Refuges

onstitute THE largest public waterfowl unting lands in the lower Mississippi Delta. is civically un-responsible to take water hat is utilized on public waterfowl hunting and and sell it at highly subsidized rates for use on private hunting lands.

And it is not just with waterfowl. River levels would be lowered during the times of year when fish spawn occurs. Addtionally, the very water the Corps proposes to pump from the White River for rice production is currently being used for production of seed.

Pecans, acorns, walnuts and other mast seeds used by deer, squirrel and waterfowl are produced in abundance when the river bottoms flood. The same drought that has impacted agriculture has also had a negative effect on the acorn crop in the river basin. Apparently, the proponents measure the production of rice and soybeans as more important than food production for waterfowl, deer and other wildlife.

Mr. McKenzie's alternative is responsible from the standpoint of the communities and towns who reap economic benefit from the

river. What impact will the loss of duck hunting days mean to towns like Clarendon, Brinkley, Augusta, Stuttgart and others? What impact will a reduction in the amount of food for deer have on these towns? None of this has been studied by the Corps, Arkansas Soil and Water nor the WRID.

The Corps quickly counters these facts by saying that the pumping regime will be conducted in such a way as to not effect the health of the White River and the bottomlands. Unfortunately, the Corps does not have control over when and how pumping will take place. This is controlled by the Arkansas Soil and Water Commission.

In its White River "allocation plan" Soil and Water established a pumping "floor" of 16 feet on the Clarendon gauge. Below this no pumping would take place. However, language in that same plan provides that the Director of Soil and Water can deviate from the plan if necessary. One of the primary factors to be considered in determining whether to deviate or not was the "cost of any infrastructure or improvements". Imagine that the White

ver is at 10 feet as it is today, it dry in July nd farmers are demanding water. Is it ealistic to believe that Soil and Water will or even could reject the demands of the farm community to "turn on the pumps"? Absolutely not! How could Soil and Water justify letting millions of dollars in crops burn up when the mechanism is in place to pump water. They could and would not. The term "excess water" would be relegated to coffee shop debates but total removed from reality. Any water within the banks of the White River, regardless of its level, would be available for agricultural use.

Irrigation technology has clearly demonstrated that this vast water resource can be depleted in short order. In less than 100 years, this underground lake we call the Alluvial Aquifer has been placed in jeopardy. A lake which extends under most of Eastern Arkansas into Mississippi and Tennessee. If a water resource this large can be depleted in that short a period, how long will the White River survive? How long will rice farming remain on the Grand Prairie

urvive if this avenue is pursued? Not long!

The alternative presented by Mr. McKenzie eliminates all of these issues and the controversy they create. Instead of putting a band-aid on the problem, it gets to the root of the problem and fashions a remedy that can sustain irrigated agriculture for future generations. A remedy that is responsible, non-controversial but most importantly for agriculture, sustainable.

Grand Prairie Area Demonstration Project

Recently, a paper was provided to the Grand Prairie On-Farm Environmental Team. This paper included an alternative to the Grand Prairie Area Demonstration Project called the Grand Prairie Alternative (GPA). It stated that this proposal was presented at a TWS meeting on February 7, 2001. It also included a mobilization strategy as quoted below.

> "Given that the crucial Congressional Appropriations cycle is rapidly approaching, there may be insufficient time to become immersed in a GPA feasibility analysis that strives for a 100% level of certainty. Rather, it might be more important to quickly join forces with agricultural opponents of the GPADP with a moderately well researched GPA and attempt to cast a reasonable doubt over Congress' consideration of the $319 million GPADP appropriation. This potentially could fir in with the new administration's desire to reduce government spending. It also might be a good idea to develop the GPA behind the scenes and seek an influential local farmer – or group of producers – to take credit for the proposal and sell it to others in the community, particularly if they have any links to the Governor's Water Task Force."

This GPA proposal claimed to be able to develop surface water supplies sufficient to irrigate 75% (180,000 acres) of the cropland in the Grand Prairie project area by increasing irrigation efficiency to 80% and increasing storage. The proposal also said that the farmers would be paid to retire that land unable to be irrigated and get paid for the land converted to reservoirs.

The information presented in this proposal was considered by the Corps and the NRCS. Studies conducted by the Natural Resources Conservation Service and others have indicated that getting 80% irrigation efficiency over a large area is just not possible. Getting 80% on an individual farm may be possible, but it is not possible over a large area. Even with 80% efficiency and additional storage, irrigated agriculture could not be continued on 180,000 acres. Analyses indicate that the with an increase to 80% efficiency but without a source of additional water, water would be available for only 72,900 acres. Approximately 18,300 additional acres could be irrigated over the 54,600 in the future without project conditions. This mean that even with an increase to 80% efficiency, water would not be available to continue irrigation on 70% of the land currently irrigated with disastrous effects to the regional and national economy.

From a practical standpoint, this winter (2001) is the first time in the last 3 years that many farmers have reported being able to fill their existing reservoirs. The Grand Prairie Area Demonstration Project will more than double the recoverable storage in the project area filling these reservoirs first from rainfall. Studies have been conduced on the amount of rainfall that could be captured. Increasing reservoirs without a source of water to fill them in most years will spread the existing water over more surface acres and increase evaporation.

The majority of the Grand Prairie is not wetlands, it was a prairie. It is not likely the land payments program proposed would ever be funded to such an extend over such a relatively limited area when the WRP program is targeted to wetlands.

The paper implies that the Grand Prairie will not save the aquifers. Two fresh water aquifers underlay the Grand Prairie, the Mississippi Valley Alluvial Aquifer and the Sparta Aquifer. As the alluvial is depleted, irrigators are turning to the Sparta witch also furnishes the drinking water and water for industry. This resource does not have the water carrying or recharge capacity of the alluvial and will be depleted by agricultural use. It also is more susceptible to permanent compaction and salt water intrusion from the salt-water aquifers located underneath as its water level and water pressure drops. The Grand Prairie Area Demonstration Project does not use any water from the Sparta aquifer for irrigation. The water from the Sparta is also much more expensive. The project would still use the alluvial aquifer at its long-term safe yield, the water that could be pumped after the aquifer is essentially depleted. This number is significantly less than the current recharge rate for the project. The project has a water shortfall on an average annual basis, but even if the short fall is met from the alluvial aquifer, its current recharge rate is greater than the safe yield plus the unmet need. This assumes that the project is built before the aquifer is depleted.

The stated purpose of this proposal is to "cast a reasonable doubt" over the Congressional appropriation for the Grand Prairie Area Demonstration Project. The paper stated that a feasibility level study will not be done. Even if the people developing it were serious about implementation and a means was found to implement it, this GPA proposal would not realize the benefits claimed. The Grand Prairie Area Demonstration Project has had years of serious study and has just completed a review of the water sources for the project. Environmental agencies were involved in the studies, and all environmental reviews have been completed for compliance with the National Environmental Policy Act. Studies have indicated that no significant impacts to the White River would occur. The project was planned allocating water to the needs of fish and wildlife, water quality, and navigation before any water diversion would occur. The project will protect both the Sparta and Mississippi Valley Alluvial Aquifers and will provide the water necessary to continue irrigated agriculture in the Grand Prairie.

Summery of primary objectives of the "California" plan. No documentation was offered to support the plan, the ability to implement the plan, or its results.

- Prevent water diversions from the White River
- Prevent the establishment of a comprehensive water distribution system that could easily be modified, at a later date, into a system capable of diverting water from the White River
- Develop surface water supplies sufficient to irrigate 75% (180,000 acres) of the cropland in the Grand Prairie project area ***This is not possible***
- Enhancement of existing water storage reservoirs ***This is included in the authorized project***
- Construction of new water storage reservoirs ***This is included in the authorized project***
- Water conservation measures (tailwater recovery, pipelines, applications systems) ***This is included in the authorized project***
- Retire cropland through mechanisms *more lucrative* to farmers than the continued cropping of soybeans and other lower value cash crops ***There is currently no mechanism available to get Federal funds to do this***
- WRP (Special Project $ appropriated and not subject to competitive ranking), combined with the additional lease of waterfowl hunting rights of sale of WRP land for a duck club ***Most of the Grand Prairie is not wetlands, without rice farming there would be many fewer ducks on the Grand Prairie. There is currently no mechanism available to get Federal funds to do this***
- Irrigation storage reservoirs with land use payment (75-100% of land value for loss of cropping potential + 75-100% cost-sharing) ***There is currently no mechanism available to get Federal funds to do this***
- Gain the support of members of the agricultural community that may have been 'on the fence" with respect to the GPADP

The debate on 70% vs 80% average irrigation efficiency for the Grand Prairie Project.

Irrigation Efficiency is the ratio of the average depth of irrigation water beneficially used to the average depth applied, expressed as a percentage.

While the concept of Irrigation Efficiency seems simple and straight forward, the actual application of this term to field practice is very complicated and difficult to understand. Irrigation Efficiency is directly related to a myriad of variables which must be considered when deciding when and how much to irrigate. Some of the factors influencing irrigation efficiency include field slope, field size, soil type, soil texture, slope variability, paddy size, furrow length, flow rate, water source availability (timing), water source amount, infiltration rates, deep percolation rates, rainfall, evaporation rates, temperature, existing soil moisture, available water holding capacity of the soil, traffic pans, irrigation application methods, and probably most important of all, management practices.

From "Design and Operation of Farm Irrigation Systems" an ASAE Monograph Number 3 in a series published by American Society of Agricultural Engineers, September 1983

"One of the most important terms that is used extensively by irrigation specialists in designing and operating irrigation projects is irrigation efficiency. However, the same term is not well understood by many policy makers and others **only casually acquainted with irrigated agriculture**." ...
"Undoubtedly, many irrigated projects could reduce the net consumption of water by substantial improvements in the distribution and on-farm systems, but the savings in water generally will not be proportional to the changes in irrigation efficiency as is often erroneously assumed. This is a very common misconception that is expressed by the general public when evaluating or considering the use of water for crop production."

An interagency task force report (ITFR, 1979) indicated that "If all measures in the Soil Conservation Service survey were implemented under a 25-yr accelerated program, it is estimated that conveyance efficiency could be increased 10 percent, and on-farm efficiencies 13 percent."

NRCS has estimated an average 10% improvement in on-farm irrigation efficiencies as a result of installing conservation practices in the Grand Prairie Project Area.

From "United States Department of Agriculture, Soil Conservation Service, National Engineering Handbook, Section 15, Irrigation, Chapter 4, Border Irrigation"

Success in designing an irrigation system depends on the ability of the designer to make a reasonable estimate of the efficiency that can be achieved on a particular site under a given set of management conditions. In most cases, the principal hazard is overestimating efficiency, which leads to designing an irrigation system which cannot achieve adequate irrigation at the efficiency that can actually be obtained. "In all irrigation methods, efficiency is affected more by the **management practices** of the irrigator than by any other factor."

"On gently sloping well-leveled fields, if adequate facilities for the control and distribution of water are installed **and good irrigation management practices are followed**, a field efficiency of 60 to 75 percent usually is feasible."

Table 4-12 lists "Suggested design efficiency for graded border irrigation by slope and intake family." The values range from 50% to 80% with 15 instances of 80% recommended as a "field design" efficiency out of approximately 350 instances listed in the table.

It should be noted that contour levee irrigation is modified form of border irrigation and is slightly less efficient due in large part to the varying sizes of the "paddies".

From "United States Department of Agriculture, Natural Resources Conservation Service, National Engineering Handbook, Part 652, Irrigation Guide"

Section 652.0904(b) Irrigation efficiency definitions

"Irrigation efficiencies are a measure of how well an irrigation system works as well as the **level of management** of the system."

(7) Potential or design application efficiencies

"Potential or design application efficiencies are usually those recommended in the irrigation guide and in various tables and charts in NEH, Part 623, (Section 15) Irrigation. These efficiencies are typically used for designing irrigation systems. The efficiency recommendations usually assume **good management** and maintenance of a well designed and installed system." ... "Judgement by the designer is required. Overestimating the operators level of management can result in an inadequate irrigation system design."

SUMMARY

On February 7, 2001, a paper entitled "A Central Valley of California Perspective on the Grand Prairie Area Demonstration Project and Ideas that Could be Incorporated into a Grand Prairie Alternative" was presented at a TWS meeting by Mr. Dave Smith. In this paper Mr. Smith touts the need to "achieve 80% irrigation efficiency".

The credentials in the field of irrigation of these individuals making these claims are not presented. The NRCS employees utilized to assist in the planning, design, and development of the Grand Prairie Area Demonstration Project plan are experts in the fields of irrigation and/or engineering. Those making the claims appear to be "**only casually acquainted with irrigated agriculture**" as stated in paragraph 1 above and have little if any knowledge related to the requirements to meet an average of "80% irrigation efficiency" for the entire project area. However, documentation of information for public and NRCS review would be considered.

The NRCS agrees that we should "strive to attain greater than 80% efficiency". However, to claim that an average 80% irrigation efficiency can be accomplished over the entire project area would be irresponsible and would likely bring questions about the economic viability of the project if the economic analysis were based on this figure.

In order to achieve an 80% average irrigation efficiency on a **single** field, an 80% average irrigation efficiency must be accomplished for every irrigation (as many as 6 per year for soybeans), for every year, for the life of the project (50 years). Projected to the farm level, every field must maintain this average for every year, for the life of the project. Projected to the project level, every farm must maintain this average for every year, for the life of the project.

Anyone with experience in handling more than a single task at a time, will realize this is a very admiral goal, but not likely to be achieved.

NRCS has utilized an abundance of information, data, studies, expertise, experience and professional judgement in order to develop the on-farm portion of the Grand Prairie Area Demonstration Project plan. We stand by this information as our best estimate of achievable results and will gladly review this information with anyone willing to spend the time necessary to understand the processes utilized in the development of this plan.

A Central Valley of California Perspective on the Grand Prairie Area Demonstration Project and Ideas that Could be Incorporated into a Grand Prairie Alternative

By Dave Smith

The Grand Prairie Area Demonstration Project (GDADP) appears similar in scope, intent, and rationale to many of the irrigation projects constructed in the Central Valley of California during the last 70 years. Foremost, the fundamental premise behind the project is that surface irrigation water must be developed to maintain irrigated agriculture in the face of a declining aquifer. Striking similarities exist between the GPADP and the events that took place in California's Tulare Basin over the past century, including the following:

- Naturally functioning wetland systems that could only be described as "national treasures" historically existed,
- The region's extraordinary hydrologic features (abundant rainfall for the White River watershed; significant snowmelt from the adjacent massive Sierra Nevada for the Tulare Basin) provided a plentiful water resource that flooded the region's wetlands in a dynamic manner,
- Drainage projects allowed conversion to agriculture during the late 1800's and early 1900's, dramatically altering the historic landscape and resulting in significant wetland loss,
- Groundwater pumping was initiated around 1910 and allowed the successful development of irrigated agriculture, but was conducted in a non-sustainable manner that ultimately threatened to deplete the aquifer,
- Irrigation projects were proposed to provide the water supplies necessary to maintain crop production at current levels.

While the fate of the GPADP and the Lower White River wetland ecosystem remains to be determined, the fate of the Tulare Basin's wetlands has been long since been sealed. Over 97% of the Tulare Basin's 500,000 acres of historic wetland have been converted into cropland. The development of flood control and irrigation projects has essentially eliminated the region's natural hydrology. Further, the appropriation of federally subsidized irrigation water to agriculture has left the remaining 3,000 acres of privately owned wetlands without a viable water source. Private wetlands water supplies in the Basin are currently comprised of 92% groundwater – pumped from depths of over 500 feet at a cost that averages $45/acre-foot. The water supply to the region's single public wetland, the Kern National Wildlife Refuge, was restored with the passing of the Central Valley Project of Improvement Act of 1992 through appropriation of 25,000 acre-feet of federal irrigation project yield to be delivered through a series of aqueducts, canals, and lift pumps. Little hope currently exists for restoring additional wetlands with significant functions and values in the region due to the lack of natural hydrology and reasonably priced water managed supplies for wetlands.

Clearly, it is conceivable that the GPADP and other irrigation projects currently proposed in the White River watershed have the potential to set in motion a chain of events that could eventually lead to a developed water system similar to that currently in place in the Central Valley of California. The relationship between loss of natural hydrology and loss of wetland acres, functions, and values in the Central Valley, particularly in the above-mentioned Tulare Basin, cannot be disputed - it is simply fact. Thus, from the Central Valley wetland wildlife conservation perspective, it would appear extremely important for the Arkansas wildlife community to aggressively seek an alternative Grand Prairie solution that <u>does not</u> involve water diversions from the White River and/or construction of a surface water irrigation system that would facilitate future diversions from the White River.